Intra and Retroperitoneal Anatomy – Landmarks and Pearls of Dissection (Didactic)

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Intra and Retroperitoneal Anatomy – Landmarks and Pearls of Dissection (Didactic)

Vadim Morozov, Chair
Maurizio Rosati, Co-Chair
Faculty: E. Cristian Campian, Christina C. Enzmann, Nucelio Lemos, S. Sony Singh, Pamela T. Soliman

This course provides a detailed review of the female pelvic anatomy, from normal appearing structures and organs to the different levels of pathologic conditions most commonly encountered in gynecologic surgery. With heavy emphasis on video-laparoscopic education, participants will have an ample opportunity to observe and discuss both “routine” laparoscopic and advanced video-laparoscopy presentations. Overview of the collecting system, with primary emphasis on the ureter and its course in the pelvis, will be discussed and demonstrated through the instructional videos. Pelvic sidewall dissection, with particular accent on avascular retroperitoneal spaces of the pelvis, will be demonstrated including the access to the uterine vessels, pelvic ureter and pelvic nerves. Potential complications of pelvic surgery will be discussed as well, with techniques aimed at avoiding and recognizing them.

Learning Objectives: At the conclusion of this course, the participant will be able to: 1) Identify normal anatomic structures of the female pelvis, 2) recognize the course of the pelvic ureter, 3) recognize the importance of the avascular spaces, 4) employ different pelvic dissection techniques, 5) integrate the knowledge of pelvic dissection into surgical practice, and 6) predict potential complications of pelvic surgery, and 7) use nerve-sparing concept in pelvic surgery.

Course Outline

8:00   Welcome, Introductions and Course Overview   V. Morozov
8:05   Pre-Sacral and Pelvic Anatomy: From Basic to Pathology   E.C. Campian
8:30   Sidewall Dissection during Laparoscopy   M. Rosati
8:55   Pelvic Vasculature   C.C. Enzmann
9:25   Retropertitoneal and Avascular Spaces: Surgeon’s Friends   P.T. Soliman
9:50   Break
10:00  Neuroanatomy and Neupreservation: Nerve-Sparing Surgical Concept   N. Lemos
11:15  When Anatomy Is Distorted: Oncology and Dissection   M. Rosati
11:40  Questions & Answers   All Faculty
12:00  Course Evaluation/Adjourn
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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Consultant: Conceptus Incorporated
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Speakers Bureau: Abbott Laboratories, Bayer Healthcare Corp., Covidien, Ethicon Endo-Surgery
Pamela T. Soliman*

Asterisk (*) denotes no financial relationships to disclose.
At the conclusion of this activity, participants will be better able to:

- Identify anatomic landmarks in laparoscopic surgery
- Apply anatomic knowledge to improve safety in the operative room
- List the most commonly neurologic injuries in minimally invasive surgery
- Describe various techniques to improve visualization in laparoscopic surgery
Pelvic vasculature

- Posterior trunk
  - Iliolumbar
  - Lateral sacral
  - Superior gluteal arteries
- Anterior trunk
  - Superior vesical
  - Inferior vesical
  - Middle rectal
  - Vaginal
  - Obturator
  - Uterine
  - Internal pudendal
  - Inferior gluteal

Laparoscopic landmarks
Nerves in MIS

- Brachial plexus
- Ulnar nerve
- Femoral nerve
- Genitofemoral nerve
- Common peroneal nerve
- Lateral femoral nerve
- Ilioinguinal and iliohypogastric nerves

Brachial nerve injury

Femoral nerve injury

Iliohypogastric and Ilioinguinal

Techniques for visualization
Thank you

References

- Gray’s Anatomy, The Anatomical Basis of Clinical Practice, Elsevier Limited 2008 1039-1099
Sidewall Dissection during Laparoscopy
Maurizio Rosati M.D.
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Dept. Obstetrics & Gynaecology,
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I have no financial relationships to disclose.

OBJECTIVES

• Describe the anatomic landmarks of the pelvic sidewall.
• List 3 surgical layers of the lateral pelvic sidewall
• Integrate surgical techniques and anatomy to reduce risk

Knowledge of the lateral pelvic wall anatomy helps with proper dissection leading to shorter operative time and patients’ safety.

Great surgical importance for Oncology, endometriosis, uro-gynaecology

Superficial intraperitoneal landmarks within the pelvis alert the operator to key anatomic structures in the retroperitoneal space

The external and internal iliac arteries may be followed superiorly to find the bifurcation of the common iliac arteries at the PELVIC BRIM

This is an ideal location to identify the ureter traversing the point of bifurcation as it enters the pelvis.
Ureteral injury

- incidence 0.4-1.5%
- gynaecological procedure account for 34% of all ureteral injuries

Site of injury

- cardinal ligament where the ureter crosses under the uterine artery
- dorsal to the infundibulopelvic ligament near or at the pelvic brim
- intramural portion of the ureter that traverses the bladder wall
- lateral pelvic sidewall above the uterosacral ligament

General principles of prevention

- the surgeon must unequivocally know WHERE the ureter is
- stay outside the adventitial sheath when performing ureteral dissection

Where is the ureter?

- Pelvic brim
- Pelvic sidewall
- knee-bend under the uterine vessels
- its average distance from the cervix is 2.2 cm at right side and 1.8 cm at left side
- turns anteriorly and medially to course over the anterolateral fornix of the vagina to enter the bladder at the junction of the upper and middle thirds of the vagina

Ureteral injury

- most common activity leading to injury is the attempt to obtain hemostasis
- when using instruments that transmit energy to tissue, the surgeon must know exactly how broad the zone of thermal injury

The pelvic sidewall is entered by opening the peritoneal reflection bordered by the round ligament anteriorly, the infundibulopelvic ligament medially, and the external iliac artery laterally.
Pelvic sidewall dissection: three surgical layers

- **First**: Ureter
- **Second**: the Visceral Layer: internal iliac artery and vein and their branches
- **Third**: the Parietal Layer: the external iliac and obturator vessels, obturator nerve

- VIDEO: pelvic sidewall dissection during laparoscopic Wertheim

**REFERENCES**

- www.uptodate.com
INTRA AND RETROPERITONEAL ANATOMY – LANDMARKS AND PEARLS OF DISSECTION

PELVIC VASCULATURE

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DISCLOSURES
No financial relationships to disclose.

Objectives
Review the blood supply of the pelvic organs.
Review the course of main branches of the internal iliac artery, as they are important for pelvic dissection.

Pelvic blood supply
- Aorta
  - Ovarian arteries
  - Inferior mesenteric a.
  - Middle sacral artery

- Common iliac artery
- External iliac artery
- Inferior epigastric artery
- Deep circumflex iliac artery
- Internal iliac artery
  - Posterior branch
  - Anterior branch

Abdominal aorta: branches to pelvis
- Ovarian
  - Travels inferiorly over pelvic brim to ovary. Through suspensory ligament.

- Inferior mesenteric:
  - Superior rectal artery:
    - Travels over left common iliac vessels into pelvic cavity.
    - Supplies superior aspect of rectum.
    - Anastomoses with middle and inferior rectal arteries.

- Middle sacral:
  - From posterior aspect of termination of aorta.
  - Travels in median plane over L4-5, sacrum, coccyx.
External Iliac

- Branches: Deep circumflex iliac artery, Inferior epigastric artery
- Becomes femoral artery

Internal iliac:
- Travels inferiorly and medially over pelvic brim
- Supplies: Pelvic organs, Gluteal muscles, Perineum
- Two divisions: Anterior, Posterior

Internal iliac: anterior division-visceral branches
- Umbilical artery:
  - Gives off superior vesicle arteries
  - Supplies superior aspect of urinary bladder
- Inferior vesical artery:
  - Supplies vagina and lower part of bladder
- Uterine artery:
  - Travels medially in broad ligament
  - Supplies uterus and vagina
- Middle rectal artery:
  - Travels inferior to lower rectum
  - Supplies lower rectum

Internal iliac artery [hypogastric artery]
- Posterior branch
  - Superior gluteal artery
  - Iliolumbar artery
- Anterior branch
  - Umbilical ligament
  - Inferior vesical artery
  - Vaginal artery
  - Uterine
  - Middle rectal
  - Obturator
  - Inferior gluteal
  - Internal pudendal

Uterine artery variation
- Type I: UA is first branch of Inferior Gluteal Artery (45%)
- Type II: UA is second or third branch of the Inferior Gluteal Artery (6%)
- Type III: UA, the Inferior Gluteal Artery and Superior Gluteal Artery arising as a trifurcation (43%)
- Type IV: UA as first branch of the Hypogastric Artery (6%)
- Inconclusive


From: Pelvic vasular anatomy: Renan Uflacker, M.D. Interventional Radiology Medical University of South Carolina

Gomez-Jorge et al: CVIR 2003
**Internal Iliac: anterior division - parietal branches**

- **Obturator artery:**
  - Travels anteriorly and inferiorly along pelvic wall.
  - Exits pelvic cavity through: Obturator canal (in obturator foramen).
  - Supplies: Pelvic muscles, ilium, femoral head, muscles of medial thigh.

- **Inferior gluteal artery:**
  - Travels anteriorly and through greater sciatic foramen.
  - Usually passes inferior to piriformis muscle.
  - Supplies: Coccygeus muscle.
  - Three levator ani muscles.
  - Quadratus femoris muscle.
  - Uppermost posterior thigh muscles.
  - Gluteus maximus.

- **Internal pudendal artery:**
  - Inferior rectal
  - Labial arteries
  - Dorsal artery of clitoris

**Internal iliac: posterior division**

- **Iliolumbar artery:**
  - Travels posterior to sacroiliac joint posterior to common iliac vessels and psoas major muscle.
  - Supplies:
    - Psoas major muscle.
    - Iliacus muscle.
    - Quadratus lumborum muscle.
    - Cauda equina (in vertebral canal).

- **Lateral sacral artery:**
  - Travels on anteromedial aspect of piriformis muscle.
  - Sends branches to ventral sacral foramina.
  - Supplies:
    - Piriformis muscle.
    - Sacral canal structures.
    - Erector spinae muscles.

**Venous return**

- Two independent networks: the parietal and the visceral venous return.
- Parietal veins travel with the arteries.
- Main collectors are internal iliac veins, ovarian and superior rectal veins.
- Left ovarian vein drains into left renal artery
Venous return

- Visceral venous return from the area of the internal iliac is facilitated by venous plexi, which help with organ cushioning.
- Vesical, vaginal, uterine, rectal veins plexi.
References

- Baggish/Karram, Atlas of pelvic anatomy and gynecologic surgery, 2002
- Williams, Gynecology, 2008
- Sobotta, Atlas der Anatomie des Menschen
- Renan Uflacker, PowerPoint presentation, ‘pelvic vascular anatomy’
- Chris DeSimone, MD, ‘Anatomy for the gynecologic oncologist’, PowerPoint presentation
Retropitoneal & Avascular Spaces: Surgeon’s Friends

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I have no financial relationships to disclose.

• Review of relevant anatomy
• Accessing the avascular spaces
Avascular Spaces of the Pelvis

- Space of Retzius
- Paravesical spaces
- Pararectal spaces
- Rectovaginal space
- Pre-sacral space

Key Laparoscopic Reference Points

- Anterior abdominal wall
  - Umbilicus
  - Epigastric Vessels
  - Palmer’s Point
- Vesico-uterine space
  - Medial umbilical ligament
- Posterior cul-de-sac
  - Uterosacral ligaments
  - Space of Denonvilliers (rectovaginal space)
- Pelvic Sidewall

Anterior Abdominal Wall

- Umbilicus
  - Position relative to great vessels varies with obesity
  - Elevation with Verres needle insertion
  - ↑ Insufflation pressure for trocar insertion
- Epigastric Vessels
  - Stay four fingerbreadths lateral to midline
- Palmer’s point
  - LUQ, mid-clavicular line 2 cm below costal margin

Vesico-uterine space

- Median umbilical ligament
  - The signpost pointing to the uterine artery
  - First branch of the hypogastric artery
  - Continuation of the superior vesical artery
  - Uterine artery always located just distal and medial to this structure

Medial Umbilical Ligament
Rectovaginal Space

Pelvic Sidewall
- The secret weapon of gynecologic surgery
- Entry via division of the round ligament – “the window of the pelvis”
- Three surgical landmarks separated by two surgical spaces

Avascular Spaces of the Pelvis
- Space of Retzius
- Paravesical spaces
- Pararectal spaces
- Rectovaginal space
- Pre-sacral space

Space of Retzius (retropubic space)
- Anterior – transversalis fascia
- Floor – urethra, peri-urethral tissue and bladder neck
- Lateral pubic rami and Cooper’s ligament

Paravesical spaces
- Lateral – obturator internus, obturator nerve
- Medial – medial umbilical ligament, superior vesical artery

Pararectal Space
- Anterior – cardinal ligament
- Medial – ureter
- Lateral – internal iliac vessels
Pre-sacral Space

- Anterior - rectum
- Posterior – sacrum
- Inferior – levator muscles

Pelvic Sidewall – 3 Surgical Layers

Lateral Pelvic Sidewall

Principles of Laparoscopic Dissection

- Always identify the anatomy
- Continually orient to visual landmarks
- Laparoscopic instruments are NOT laparotomy instruments
  - Small jaw excursion
  - Finer muscular motion required
- Isolate structures individually
  - Cannot grab the entire cardinal ligament and assume the uterine artery is "somewhere in there"

Conclusions

- Knowing the anatomy is key
- Use landmarks that are easy to identify
- Avascular spaces are the key in difficult cases
- Use these techniques in the “easy” cases to prepare for the more difficult ones
Neuroanatomy and Neuropreservation: Nerve-Sparing Surgical Concept

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Fellowship in Neuropelveology by the International School of Neuropelveology, Klinik Hirslanden, Zurich
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Chair of the Scientific Committee of the International Continence Society

Disclosures
I have no financial relationships to disclose.

Why nerves?
What is the role of the pelvic surgeon?

Lumbar Nerves
- Iliohypogastric N.
- Ilioinguinal N.
- Genitofemoralis N.
- Femoral N.
- Obturator N.
Sacral & Coccigeal Nerves

- Superior Gluteal N.
- Inferior Gluteal N.
- Post. Cutaneous Femoralis N.
- Sciatic N.
- Pudendal N.

Autonomic Nerves

- Hypogastric Nerves (sympathetic)
  - Proprioception (filling sensation)
  - Internal urethral and anal sphincters
  - Sup. Hypogastric Plexus (derived from sympathetic trunk)
  - Pelvic Splanchnic Nerves (nervi erigenti)
  - Detrusor contraction
  - Colon descendens, sigmoid and rectum
  - Perineal and gluteal pain

Proprioception (filling sensation)

Sensitive Innervation

- L2/L3 - Hip flexors (ilipsoas)
- L3 - Hip adductors
- L3/L4 - Knee extensors (quadiceps)
- L5 - Ankle dorsiflexion, eversion and inversion + hip abductors
- S1 - Ankle plantar flexion + hip extensors
- S2 - Erection ♂ / Lubrication ♀
- S2/S4 - Detrusor / Colon descendens

Motoric Innervation

- L2/L3 - Hip flexors (ilipsoas)
- L3 - Hip adductors
- L3/L4 - Knee extensors (quadiceps)
- L5 - Ankle dorsiflexion, eversion and inversion + hip abductors
- S1 - Ankle plantar flexion + hip extensors
- S2-S4 - External anal and urethral sphincters

Autonomic Innervation

- S2 - Erection ♂ / Lubrication ♀
- S2/S4 - Detrusor / Colon descendens

Symptoms of Intrapelvic Nerve Entrapment

- Perineal pain or pain irradiating to the lower limbs, or motoric deficit on the lower limbs, in the absence of a spinal disorder
- LUTS in the absence of prolapse or bladder lesion
- Tenesmus and/or dischezia associated with perineal and/or gluteal pain
- Rectal or vaginal foreign body sensation
Fibrosis

Endometriosis

Muscular Compression

Vascular Entrapment

Nerve Transection

- Laparotomy
  - (ilihypogastric, ilioinguinalis)
  - Incision
  - Retractors
  - Laparoscopy
  - (ilihypogastric, ilioinguinalis)
  - Episiotomy
  - (pudendal nerve rami)
  - Lower Limb Amputation
    - (Sciatic & femoralis)
Avoiding Nerve Lesion on Radical Gynecological Surgery

Autonomic Nerves

Hypogastric Nerves

Pelvic Splanchnic Nerves

- LESION
  - Loss of bladder proprioception
  - "Stress Urinary Incontinence"

The LANN Technique to Reduce Postoperative Functional Morbidity in Laparoscopic Radical Pelvic Surgery


Image from Netter

Hypogastric Nerve

Image from Netter

Hypogastric Nerve

Bladder 1 year later. In all other patients, neither postoperative suprapubic catheter nor bladder training was mandatory, so our percentage of chronic bladder atony was 0.61%. Any kind of early or late fistula or additional...
Hypogastric Nerve

- Proprioception (filling sensation)
- Internal urethral and anal sphincters

Autonomic Nerves

- Sup. Hypogastric Plexus (derived from sympathetic trunk)
- Pelvic Splanchnic Nerves (nervi erigenti)
- Detrusor contraction
- Colon descendens, sigmoid and rectum
- Nociception

Preventing Post-Operative Bladder/Rectal Hypo/Atonia

- Never dissect the pararectal fossae bilaterally without priorly exposing the sacral nerve roots and the pelvic splanchnic nerves

Preventing Post-Operative Bladder/Rectal Hypo/Atonia

- In case of bilateral disease, leave some endometriosis behind
  - Expose of the sacral nerve roots
  - Calculate damage to the nerves
- Always use HD camera and intraoperative neurostimulation when dissecting the pelvic splanchnic nerves
Preventing Post-Operative Bladder/Rectal Hypo/Atonia

In Conclusion...

- Identification of the pelvic splanchic is only possible by dissecting the sacral nerve roots.

- Signs suggestive of pelvic nerve involvement:
  - Perineal pain or pain irradiating to the lower limbs, or motoric deficit on the lower limbs in the absence of a spinal disorder;
  - LUTS in the absence of prolapse or bladder lesion;
  - Tenesmus and/or dischezia associated with perineal and/or gluteal pain;
  - Nodule on the rectovaginal septum.

Be prepared (team and equipment) to expose and/or decompress sacral nerve roots and/or sacral and pelvic splanchnic nerves.

Preventing Post-Operative Bladder/Rectal Hypo/Atonia

Preventing Post-Operative Bladder/Rectal Hypo/Atonia

In Conclusion...

- Identification of the pelvic splanchic is only possible by dissecting the sacral nerve roots.
In Conclusion...
- It is not possible to dissect the pelvic splanchnic nerves out of endometriosis
- Calculated damage!

In Conclusion...
- Sometimes, the wisest decision is to leave some disease behind

Thank you!

References

ANATOMY OF THE PELVIC URETER: WHAT NOT TO CUT?

Vadim Morozov
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EMBRYOLOGY OF KIDNEY AND URETER

- Pronephros – week 4 of gestation
- Duct of pronephros – persists as mesonephric duct
- Mesonephric duct – extends caudally into urogenital sinus
- Ureteric bud – posteromedial aspect of mesonephric duct
- Proximal bud - renal pelvis, calyces
- Ureters – caudal portion of the ureteric bud

URETER IN GYNECOLOGY

- 0.4 -1.5 % injury rate in Gynecologic surgery
- about 30% of urologic ureteral repair cases

URETERAL INJURY

- One of the most feared complications of Gynecological surgery
- The average distance from the ureter to the cervix: 2.3 cm (range 0.1 to 5.3 cm)
- Gynecologic disease may involve the ureters directly, or cause their course to deviate significantly.

DISCLOSURES

- Consultant: Covidien
- Stockholder: Titan Medical
- Other: Proctor: Intuitive Surgical
ANATOMY OF THE URETER

- Tubular structure 3-10 mm in diameter
- S-shaped in course
- Consists of 3 distinct layers:
  - Inner longitudinal
  - Middle circular
  - Outer longitudinal

ANATOMY OF THE URETER

- Length: 28-34 cm
- 3 physiologic narrow points:
  - Ureteropelvic junction
  - Crossing the iliac vessels
  - Ureterovesicular junction

ANATOMY OF THE URETER

- Begins at the level of L1 vertebral process
- Travels in the retroperitoneal space
- Enters the pelvis medial to the sacro-iliac joints
- Follows the hypogastric vessels
- Travels in the posterior border of the ovarian fossa

BLOOD AND LYMPHATIC SUPPLY

- Upper ureter: ureteric branch of the renal artery
- Middle portion: gonadal vessels, aorta, retroperitoneal vessels
- Pelvic ureter: hypogastric artery, vesical artery

BLOOD AND LYMPHATIC SUPPLY

- Venous and lymphatic drainage – the same as arterial supply
- Nerve supply:
  - alpha-adrenergic (excitatory)
  - beta-adrenergic (inhibitory)
- Peristalsis of the ureter is INDEPENDENT from these fibers

Courtesy of P Pasic
SITES OF INJURY
- Cardinal Ligament: the ureter crosses under the uterine artery
- Dorsal to the infundibulopelvic ligament near the pelvic brim
- Intramural portion of the ureter that traverses the bladder wall
- Tunnel of Wertheim
- Lateral pelvic sidewall above the uterosacral ligament.

TYPES OF URETERAL INJURY
- Clamp application
- Suture ligation
- Transection (partial or complete)
- Angulation with secondary obstruction (partial or complete)
- Devascularization
- Segmental resection (radical surgery)
- Electrosurgical/thermal injury

LAPAROSCOPIC URETERAL INJURIES
- Less common 0.3%-0.4%
- More likely from thermal injury
- Likely to be diagnosed within a significant time interval (days or more)
- Decreases the probability of a successful primary repair and increase the risk of long term sequelae

“MOST COMMONS” OF URETERAL INJURY
- Most common site: Pelvic brim near IP ligament
- Most common procedure: TAH, Concurrent prolapse
- Most common type of injury: Obstruction
- Most common “activity” leading to injury: Attempt to obtain hemostasis
- Most common time of diagnosis: None. 50/50 split between intraop vs. postop

GENERAL PRINCIPLES OF PREVENTION AND MANAGEMENT
The surgeon must know where the ureter is.

Stay outside the adventitial sheath when performing ureteral dissection

When using instruments that transmit energy to tissues, the surgeon must know exactly how broad the zone of thermal injury

URETER DISSECTION WITH SILS
Courtesy P Pasic
IDENTIFYING URETERAL INJURY

- Flank or groin pain, fever, retroperitoneal fluid collection, ileus
- 50% of women with unilateral ureteral obstruction are asymptomatic
- Creatinine increase of 0.8mg/dL may be related to unilateral ligation

DIAGNOSING

- Inspection and Await Peristalsis
  - Approximately 80% still have peristalsis after injury
- Intraoperative Cystoscopy:
  - Flow from ureters excludes total obstruction, but not partial obstruction
  - Ureters that have been devascularized may appear intact, yet develop fistulas later
  - Marked delay between drainage from one ureter may suggest partial obstruction
  - Blood coming from a ureteral orifice - suspicious
- Cystoscopy
- Intravenous Pyelogram
- CT Urogram (most preferred by urologists)
- Renal Ultrasound
- Pyridium-Methylene Blue Test
**MANAGEMENT**

- **Ureteral Ligation:** remove suture, assessment of viability, stent placement
- **Partial transection:** Primary repair over ureteral stent
- **Total Transection**
  - Uncomplicated upper and middle thirds: Ureteroureterostomy over ureteral stent
  - Complicated upper and middle thirds: Uretero-ileal interposition
  - Lower third: Uretero-neocystotomy with psoas hitch over ureteral stent
- **Thermal Injury:** Resection with management as per a transection

**SEQUELAE OF URETERAL INJURIES**

- Spontaneous resolution and healing (rare).
- Posthydronephrotic renal atrophy with or without sepsis.
- Animal studies suggest that there is rarely return of any renal function following 40 days of complete ureteral obstruction, however there is clinical evidence of recovery of renal function in humans for longer periods of obstruction.
- Ureteral necrosis with urinary extravasation.
- Secondary stenosis of the ureteral lumen at the site of injury, or stenosis of fistula tract with silent atrophy of the kidney or pyoureteronephrosis.
- Uremia - results from bilateral ureteral injury with obstruction (rare).

**REFERENCES**

3. Up To Date. www.uptodate.com

Many thanks to Paya Pasic for his help with this presentation.

Thank you.
Difficult Hysterectomy: Is there a better way?
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• Grants/Research Support: Abbott Laboratories, Minerva Surgical,
• Consultant: Abbott Laboratories, Bayer Healthcare Corp.
• Speakers Bureau: Abbott Laboratories, Bayer Healthcare Corp., Covidien, Ethicon Endo-Surgery

OBJECTIVES

• Identify the "complex hysterectomy" pre-operatively
• Anatomical Hysterectomy
• Approach to the difficult bladder
• Approach to the large uterus
• Impossible to Possible

What is the Complex Hysterectomy?

• Patient Factors
  – BMI
  – Medical Issues
  – Previous surgery/complications
  – Congenital anomaly

What is the Complex Hysterectomy?

• Pathology
  – Adhesions
  – Enlarged uterus - fibroids
  – “Stuck Bladder”
  – Endometriosis

What is the Complex Hysterectomy?

• Surgeon Factors
  – Experience
  – Anatomy and Dissection Knowledge
  – Equipment
The Literature and Complexity

| Number of cases | 56 | 104 | 160 | 175 | 350 |
| Number of surgeons | 143 | 43 | 2 | 1 | 1 |
| Mean uterine weight | 7 | 7 | 7 | 293 g | 7 |
| Number of complications | 7 | 12 | 9 | 4 | 1 |

The Anatomical Hysterectomy

Versus

THE SEAL AND CUT Technique

What do we teach today?

- “Clamp – Cut – Ligate”
- “Hug the uterus”
- “Hope for the best!”

The average gynecologist was not trained in applied detailed surgical anatomy and the art of vascular dissection.

The gynecologic-oncologist was trained in applied detailed surgical anatomy and the knowledge of how to access the retroperitoneum.

The practice of gynecology is changing and surgical training is changing accordingly.

Technique, not Technology

- “How big a vessel can this device seal?”
  - When was the last time we measured a vessel before we cut it?
- Devices such as advanced bipolar and ultrasonic technology FACILITATE our surgery... they do not do our surgery.
- The Robot FACILITATES surgery... it does not do our surgery.

Anatomical Hysterectomy

- An approach to hysterectomy that is based on the importance of isolating our anatomical structures including vasculature and ureters.
- Provides a skill set that will allow almost any hysterectomy to be performed minimally invasively.
- Provides “the secret” of the good gynecologic oncologist.
Anatomy is the key. The Pelvic Sidewall Anatomy

- Understanding it will allow you to:
  - Approach the “Frozen Pelvis”
  - Dissect the ureter to keep it from harm
  - Identify and isolate the uterine vessel so you can clip it, coagulate it, suture it
  - Identify and isolate the internal iliac in really tough cases

3 Layers of Pelvic Sidewall

1st Layer
- Parietal peritoneum & ureter

Avascular Space

2nd Layer
- Internal iliac Vessels & tributaries (Uterine, Superior Vesical arteries)

Avascular Space

3rd Layer
- Obturator nerve, artery, vein
- External iliac artery & vein

Upstream Vessel Control

Extraperitoneal Spaces

- Paravesical Sapce
  - Mobilize & reflect bladder inferiorly
  - Decrease bladder & ureteric injury
- Pararectal Space
  - Identify ureter & iliac vessels
  - Visualize levator ani muscles
  - Mobilize rectum & sigmoid
The Difficult Bladder

Urinary Tract Injury

- Most common site of injury at hysterectomy
- Incidence: 0.1 – 1.3% \(^1\)
- Cochrane Review 2009 \(^2\)
  - Significant increase in urinary tract injury for LH versus AH (OR 2.41, 95% CI 1.21 to 4.82)
  - Statistically significantly more urinary tract injuries for TLH versus VH (OR 3.69, 95% CI 1.11 to 12.24)

Good surgical technique and experience can reduce the risk of bladder injury

STEPS: DIFFICULT BLADDER AT LAP HYST

1. Anticipate potential difficulties preoperatively
2. Develop paravesical spaces bilaterally
3. Optimize visualization & anatomic relationships
4. Dissect bladder flap lateral to medial
5. Consider alternatives
6. Identify & repair injury

Video Presentations

Enlarged Uterus
Enlarged Uterus

- Any uterus that is enlarged enough such that the visualization of the normal anatomy required to perform a laparoscopic hysterectomy is obscured.

ENLARGED UTERUS

- Hysterectomy for the enlarged uterus
  - Laparotomy - Traditional approach
  - Vaginal
  - Laparoscopic

With good surgical technique, laparoscopic hysterectomy is feasible and safe, regardless of uterine weight.

Preoperative ASSESSMENT

- Key indicators of surgical success / difficulty
  - Uterine size
  - Uterine Mobility
  - Lower Segment Width - affects access to uterine vessels
  - Concomitant diagnosis (eg. Endometriosis, adnexal masses)
  - Patient parameters (eg. BMI, previous surgeries)

- Preoperative optimization of anemia or uterine size can be facilitated with use of GnRH agonist.

Using the Tips for Difficult Cases

Placenta Incomplete
Approach to the “impossible”

- Left upper quadrant entry
- Lateral retroperitoneal dissection and development of pelvic spaces
- Ligation of uterine vessels at the level of the internal iliac artery
- Dissection of vesico-uterine plane
- Colpotomy
- Delivery of uterus vaginally
- Vault closure

Conclusion

- There is a better way
- Let anatomy be your guide
- Dissection of relevant vasculature and the ureter will help improve outcomes
- From the Known to the Unknown and Back!

References:
When anatomy is distorted: oncology and dissection

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I have no financial relationships to disclose.

1. Review obstacles to laparoscopic dissection
2. Present laparoscopic tricks to overcome them

When is anatomy distorted?

- Adhesions make impossible to identify anatomic landmarks and surgical layers
- Sometimes different structures may result in a unique and mixed conglomerate
- Adhesion may induce a stenosis of ureter

- video
  1. Lysis of dense adhesions between recto-sigma, uterus and adnexa
  2. Stenosis of left ureter: ureteroneocystostomy

When is anatomy distorted?

- Oncologic infiltration of adjacent structures

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When is anatomy distorted?

Voluminous masses may alter position or may cause stenosis of such pelvic structures.

- video: retroperitoneal pararectal mass

Increased risk of complications

- Bowel injury
- Genitourinary injury

Bowel injury

- Injury may not be apparent for 4-5 days
- Any symptoms of peritonitis (sharp abdominal pain, vomiting) must be considered as bowel injury unless proven otherwise
- Delayed diagnosis remains major problem; up to 15% of injuries not diagnosed during laparoscopy; one in five cases of delayed diagnosis results in death

Bowel injury

- Penetrating injuries due to the pneumoperitoneum needle can be managed conservatively and generally do not require any treatment
- The vast majority of trocar punctures require only suture reapproximation.
- Electrosurgical injuries require resection of 1 to 2 cm of viable tissue around the injury site to ensure that all of the damaged tissue has been removed

Genitourinary complications

Bladder (Methilene blue)
- If <1cm consider Foley catheter for 7-10 days
- If >1cm laparoscopic 2 layer closure + Foley

Ureter (Trace from pelvic brim/ Cystoscope)
- primary repair over stent
- ureteroneocistostomy
• VIDEO single access laparoscopic rectal anterior resection and ureteral resection

REFERENCES


• www.uptodate.com

CULTURAL AND LINGUISTIC COMPETENCY

Governor Arnold Schwarzenegger signed into law **AB 1195** (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California’s physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

California Business & Professions Code §2190.1(c)(3) requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at [http://www.imq.org](http://www.imq.org).

Title VI of the Civil Rights Act of 1964 prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 [http://www.usdoj.gov/crt/cor/pubs.htm](http://www.usdoj.gov/crt/cor/pubs.htm).

Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”, signed by the President on August 11, 2000 [http://www.usdoj.gov/crt/cor/13166.htm](http://www.usdoj.gov/crt/cor/13166.htm) was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

Dymally-Alatorre Bilingual Services Act (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

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